OA 3302
Summer 2004
Sample Midterm Exam
Answer Key

1. Note that the graph of the number in queue can be easily obtained by drawing a horizontal line at 1 and treating it like the X axis. Also, since it was asked to "explicitly compute" the delay in the queue, you needed to determine the actual delays for the four customers.
   a. q = area under curve (with '1' as the X axis)/13.1 = 7.6/13.1 = 0.580
   b. D = (0.0 + 2.8 + 2.9 + 1.9)/4 = 7.6/4 = 1.9
   c. Yes because the queue is empty at time 12.0
   d. No because the queue is not empty at time 9.5

2. Parameters:

   t_R = Regular interarrival time

   t_L = Large interarrival time

   t_{S_R} = Regular service time

   t_{S_L} = Large service time

   k = # servers

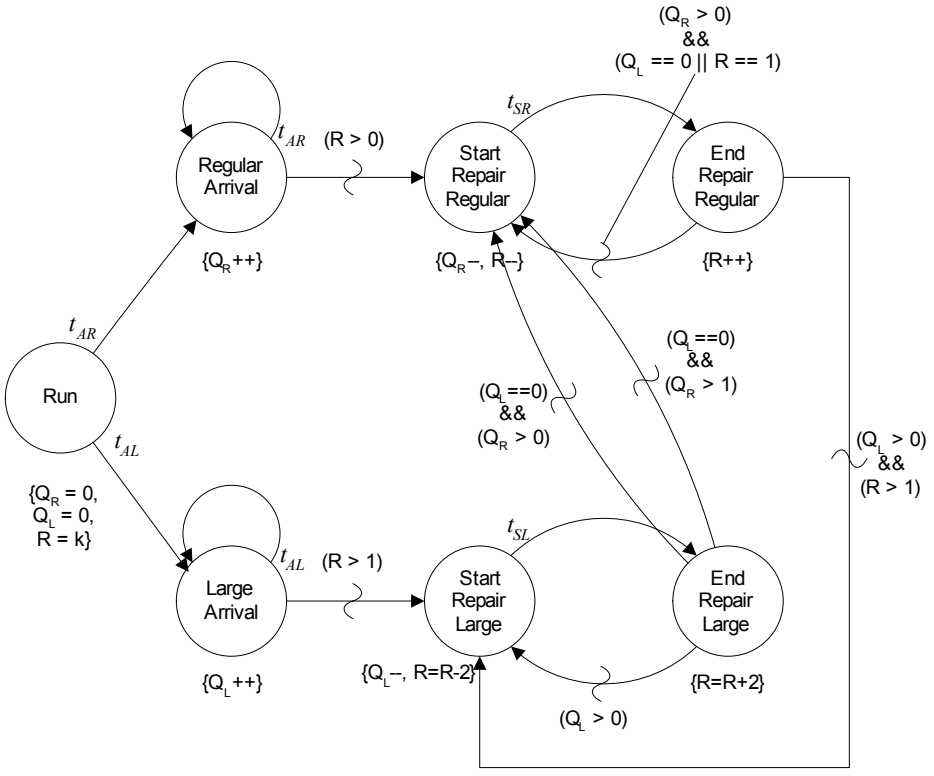
   State Variables

   Q_R = # regular in queue

   Q_L = # large in queue

   R = # available repair people

   Event Graph



3. Note that the Run event is implemented by the `reset()` and the `doRun()` methods together.

```
public class Inventory extends SimEntityBase {
	private RandomVariate interDemandTime; // tD
	private RandomVariate reviewTime;/ tL
	private int bigS;
	private int littleS;
	protected int onOrder;
	protected int inventory;

	public void reset() {
		super.reset();
		onOrder = 0;
		inventory = bigS;
	}

	public void doRun() {
		firePropertyChange("inventory", inventory);
		firePropertyChange("onOrder", onOrder);

		waitDelay("Demand", interDemandTime.generate());
		waitDelay("Review", reviewTime.generate());
	}

	public void doOrder() {
		int z = bigS - inventory - onOrder;
		onOrder += z;
		firePropertyChange("onOrder", onOrder - z, onOrder);

		waitDelay("Arrive", leadTime.generate(), new Integer(z));
	}

	public void doArrive(int a) {
		inventory += a;
		firePropertyChange("inventory", inventory - a, inventory);

		onOrder -= a;
		firePropertyChange("onOrder", onOrder + a, onOrder);
	}
}
```

4. Relative position = (60. -20) - (10, 100) = (50, -120).

   Distance = ||(60, -120)|| = $\sqrt{60^2 + (120)^2} = \sqrt{16,900} = 130$

   Velocity =(50/130, -120/130) * 10 = (50/13, -120/13) = (3.846, -9.231)